

I CLAIM:

1. A process for binding books which comprises:  
forming a plastic coil using a plastic spiral forming  
5 machine;

cutting said plastic coil to a length sufficient for said  
plastic coil to bind a book;

stopping the advancement of a conveyor belt having a  
plurality of compartments;

10 ejecting said plastic coil onto one compartment in said  
plurality of compartments located on said conveyor belt;

advancing said conveyor belt to a subsequent another  
compartment of said plurality of compartments on said conveyor  
belt, at a speed sufficient for the temperature of said plastic  
15 coil to lower, wherein said advancement is toward a receiving  
coil conveyor of a coil binding machine; and,

binding said book with said lowered temperature plastic  
coil.

20 2. A combination plastic spiral coil forming and binding  
machine comprising:

a coil forming machine forming hot binding coils at a  
first higher temperature;

a cooler cooling said formed hot binding coils to a solid,  
25 non-brittle state, and,

a binding machine for binding said cooled coils into

holes of a book being bound.

3. The combination plastic spiral coil forming and binding machine as in Claim 2 wherein said coils are cooled at ambient  
5 air temperature.

4. The combination plastic spiral coil forming and binding machine as in Claim 2 wherein said coils are cooled by exposure of said coils to pressurized blasts of compressed air.

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5. The combination plastic spiral coil forming and binding machine as in Claim 2 wherein said coils are cooled by exposure of said coils to a cooling chamber.

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6. The combination plastic spiral coil forming and binding machine as in Claim 2 wherein said coils are cooled by exposure of said coils to cooling chambers cooled by freon filled conduits.

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7. The combination plastic spiral coil forming and binding machine as in Claim 2 wherein said coils are cooled by exposure of said coils to refrigeration.

8. The combination plastic spiral coil forming and binding  
25 machine as in Claim 2 wherein said cooler comprises a linkage cooling conveyor.

9. The combination plastic spiral coil forming and binding machine as in Claim 8 wherein said linkage cooling conveyor for conveying plastic coils comprises:

5 a wide belt supported by a stationary horizontal platen, wherein said wide belt has a rigid chain construction with a plurality of fins attached thereto;

a drive pulley communicating with and advancing said wide belt;

10 a plurality of fins form compartments, wherein said compartments allow the placement of plastic coils therein;

a gear motor electrically connected to said drive pulley; and,

15 a motor speed controller electrically connected to said gear motor, wherein said motor speed controller causes said drive pulley to intermittently rotate thereby intermittently advancing said plastic coil on said belt towards a binding machine.

10. The combination plastic spiral coil forming and binding machine as in Claim 8 wherein said binding machine interacts with said plastic spiral forming machine at compatible speeds to each other, said coil forming machine having a means for taking plastic thread from a spool, a heating chamber for preheating said plastic thread, an advancement means advancing and then winding said plastic thread on a mandrel, a discharge element discharging said heated plastic thread in free air as a hot

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spiral coil, a cutter cutting said hot spiral coil being cut to a predetermined size as a hot, rigid, coil, said hot rigid coil, being transferred to said linkage cooling conveyor, said linkage cooling conveyor moving said coil intermittently, said coil being  
5 cooled by exposure to ambient air temperature; and,

said cooled coil being transported by said linkage cooling conveyor to a receiving conveyor of said binding machine at a temperature close to ambient room temperature.

10 11. The combination plastic spiral coil forming and binding machine as in Claim 1 wherein said conveyor is moved and advanced in incremental steps.

12. The combination plastic spiral coil forming and binding  
15 machine as in Claim 8 further comprising a drive motor moving said linkage cooling conveyor.

13. The combination plastic spiral coil forming and binding machine as in Claim 12 further comprising a sensor detecting an  
20 end of said plastic spiral, said sensor being adjustable to a required spiral length as dictated by a book being bound by said binding machine, said sensor initiating cutting of said hot spiral by a cutter by a signal amplified by a driver, a signal pulse from said sensor also initiating an index cycle of said  
25 motor through a controller and a logic gate, said motor being stopped when a next vane is detected in a predetermined position

by a detector.

14. The combination plastic spiral coil forming and binding machine as in Claim 13 further comprising a switch indexing  
5 advancing movement of said linkage cooling conveyor incrementally to sequentially and discretely empty said compartments of said cooled spiral coils therefrom.

15. The combination plastic spiral coil forming and binding  
10 machine as in Claim 12 wherein said drive motor is a DC direct current gearmotor.

16. The combination plastic spiral coil forming and binding machine as in Claim 12 wherein said drive motor is an AC  
15 alternating current gearmotor.

17. The combination plastic spiral coil forming and binding machine as in Claim 12 wherein said drive motor is a stepping  
20 motor.

18. A combination plastic spiral coil forming machine and binding machine for spirally binding a sheaf of papers into a book with said plastic spiral coil comprising:

- a. a coil forming machine forming a plurality of hot  
25 plastic spiral coils,
- b. a cooler cooling said hot plastic spiral coils,

c. means for clamping together the sheaf of papers making up said book, said book having a plurality of holes in a row adjacent one edge of said book to receive the leading edge of said spiral binding element;

5 d. a stationary base spaced from one end of said book;

e. a block slidably mounted on said base having an arm extending outwardly and supporting at its distal end thereof a cylindrically shaped mandrel spaced from said slidable block and the bottom edge of said mandrel horizontally in a line with said  
10 row of holes in said book, said arm being attached at its distal end to said mandrel at the proximate end of said mandrel facing said row of holes and spaced from said book and said arm attached to said block at the proximate end with means for adjusting the distance between said mandrel and said block;

15 f. feeding conveyor means for feeding onto said mandrel from the distal end thereof said plastic pre-formed, cooled spiral binding coil terminating at the proximate end of said mandrel with the leading edge of said binding coil facing and spaced from said book, the internal diameter of said spiral binding coil  
20 being slightly in excess of the outer diameter of said mandrel;

g. spring means mounted on said slidable block for engaging and biasing adjustably said spiral binding coil on said mandrel upwardly against said mandrel so that the upper portion of said binding element is spaced from the top of said mandrel;

25 h. means comprising a wheel having an outer frictional surface for engaging a top outer surface of said spiral binding

element and motor means for driving said wheel to feed said spiral binding coil into said row of holes in said book for binding same; and

5 i. means for adjusting the position of said block on said base for positioning said mandrel to obtain proper alignment of the leading edge of said spiral binding element with said row of holes.

10 19. The combination plastic spiral coil forming and binding machine as in claim 18 further comprising a means for significantly spreading apart each coil of said spiral binding element for initial insertion into respective first and last holes of a row of holes, said means comprising two leading hole spreader members insertable within said respective coils of said spiral binding wherein at a point before the spiral enters the leading hole of a sheaf to be bound, said leading hole spreader members being disposed adjacent to said leading hole and wherein another a trailing hole spreader member is located adjacent to said final hole, wherein a predetermined space between each said coil is widened by contact of a binding edge of each said spreader member around each said coil.

20 20. The combination plastic spiral coil forming and binding machine as in Claim 18, wherein said feeding conveyor comprises a horizontal coil conveyor for moving a succession of plastic spiral coils into position for mounting on said mandrel and

spreading by contact with said leading-hole spreader members,  
said conveyor comprising a feed end and a mandrel end, said  
conveyor comprising an elongated horizontal chute horizontally  
disposed in alignment with said mandrel, said chute comprising a  
5 pair of opposing walls and a floor, said floor having motive  
means for urging a succession of coils fed into said feed end of  
said chute in the direction of said mandrel end of said chute.